

## 299-W15-78 (A7379) Log Data Report

### Borehole Information:

<b>Borehole:</b> 299-W15-78 (A7379)		<b>Site:</b> 216-Z-7 Crib			
<b>Coordinates</b> (WA State Plane)		<b>GWL (ft)<sup>1</sup>:</b> Not applicable		<b>GWL Date:</b> none	
<b>North</b>	<b>East</b>	<b>Drill Date</b>	<b>TOC<sup>2</sup> Elevation</b>	<b>Total Depth (ft)</b>	<b>Type</b>
135903.317 m	566697.893 m	07/51	666.34 ft	74	Cable

### Casing Information:

<b>Casing Type</b>	<b>Stickup (ft)</b>	<b>Outer Diameter (in.)</b>	<b>Inside Diameter (in.)</b>	<b>Thickness (in.)</b>	<b>Top (ft)</b>	<b>Bottom (ft)</b>
Welded steel	1.65	8 5/8	8	5/16	1.65	74

### Borehole Notes:

The logging engineer used a steel tape to measure the casing diameter and stickup. Before logging, the borehole was swabbed for contamination and none was detected.

Hanford Wells (Chamness and Merz 1993) indicated the borehole was drilled in 1951 to a depth of 74 ft.

### Logging Equipment Information:

<b>Logging System:</b>	Gamma 2A	<b>Type:</b>	SGLS (35%) 34TP20893A
<b>Calibration Date:</b>	03/04	<b>Calibration Reference:</b>	DOE-EM/GJ642-2004
		<b>Logging Procedure:</b>	MAC-HGLP 1.6.5, Rev. 0

### Spectral Gamma Logging System (SGLS) Log Run Information:

<b>Log Run</b>	<b>1</b>	<b>2</b>	<b>3 Repeat</b>		
Date	07/19/04	07/20/04	07/20/04		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	20.0	73.0	18.0		
Finish Depth (ft)	2.0	19.0	10.0		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A <sup>3</sup>	N/A	N/A		
Pre-Verification	BA370CAB	BA371CAB	BA371CAB		
Start File	BA370000	BA371000	BA371054		
Finish File	BA370018	BA371053	BA371063		
Post-Verification	BA370CAA	BA372CAA	BA372CAA		
Depth Return	0	N/A	0		

Log Run	1	2	3 Repeat		
Error (in.)					
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.		

### **Logging Operation Notes:**

Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT ( $^{40}\text{K}$ ,  $^{238}\text{U}$ , and  $^{232}\text{Th}$ ) verifier with serial number 082.

### **Analysis Notes:**

<b>Analyst:</b>	Henwood	<b>Date:</b>	09/22/04	<b>Reference:</b>	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. Examinations of spectra indicate that the detectors functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations for SGLS spectra were calculated in EXCEL (source file: G2AMar04.xls). A casing thickness of 0.3125 in. was applied to the data. No dead time or water corrections were required.

### **Log Plot Notes:**

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides ( $^{40}\text{K}$ ,  $^{238}\text{U}$ , and  $^{232}\text{Th}$ ), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is included to facilitate correlation. The  $^{214}\text{Bi}$  peak at 1764 keV was used to determine the naturally occurring  $^{238}\text{U}$  concentrations on the combination plot rather than the  $^{214}\text{Bi}$  peak at 609 keV because it exhibited slightly higher net counts per second.

A comparison plot of the Westinghouse Hanford Company Radionuclide Logging System (RLS) data acquired in 1995 with the current SGLS data is included. An historical gross gamma logging plot has been copied from Fecht et al. (1977) and digitized. This log is plotted with the current SGLS total gamma log.

### **Results and Interpretations:**

$^{137}\text{Cs}$ ,  $^{60}\text{Co}$ ,  $^{154}\text{Eu}$ , and  $^{152}\text{Eu}$  were the man-made radionuclides detected in this borehole.  $^{137}\text{Cs}$  was detected at a few isolated locations near its MDL of 0.2 pCi/g. From 43 to 45 ft  $^{137}\text{Cs}$  was detected at each depth interval with a maximum concentration of 0.6 pCi/g.

$^{60}\text{Co}$  was detected from 43 ft to total depth of the borehole (73 ft). The maximum concentration was measured at approximately 3 pCi/g at 49 ft.

$^{154}\text{Eu}$  was detected between 43 ft and total depth. The maximum concentration was measured at approximately 2 pCi/g at 50 ft.

A comparison plot of RLS data acquired in 1995 with the current SGLS data is included. The RLS data were decayed to the date of the SGLS log data. The profiles of the sets of log data are similar, suggesting stability of contaminants since 1995.

A plot of an historical gross gamma log acquired in this borehole in 1976 is included (Fecht et al. 1977). In 1976, elevated gamma activity appears to have existed at the same depth interval as in 2004 and probably reflects activity associated with the  $^{60}\text{Co}$  and  $^{154}\text{Eu}$  that were detected in 2004. The similar total gamma profiles suggest contaminant stability in the vadose zone since 1976.

The  $^{40}\text{K}$  and  $^{232}\text{Th}$  logs show some variations in concentrations, suggesting lithology changes that may be correlated with adjacent boreholes.

## **References:**

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

Fecht, K.R., G.V. Last, and K.R. Price, 1977. *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*, ARH-ST-156, Atlantic Richfield Hanford Company, Richland, Washington.

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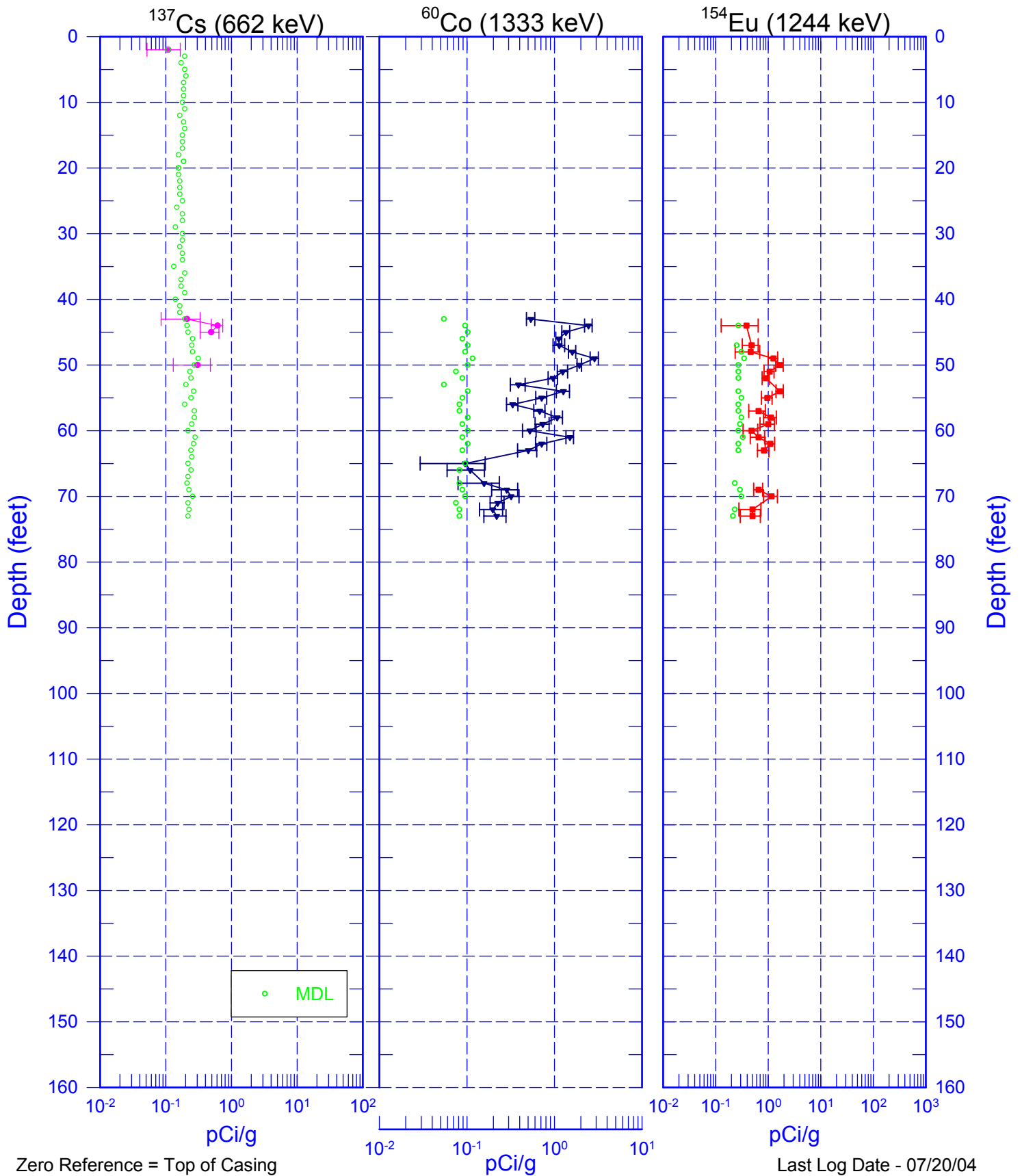
<sup>1</sup> GWL – groundwater level

<sup>2</sup> TOC – top of casing

<sup>3</sup> N/A – not applicable

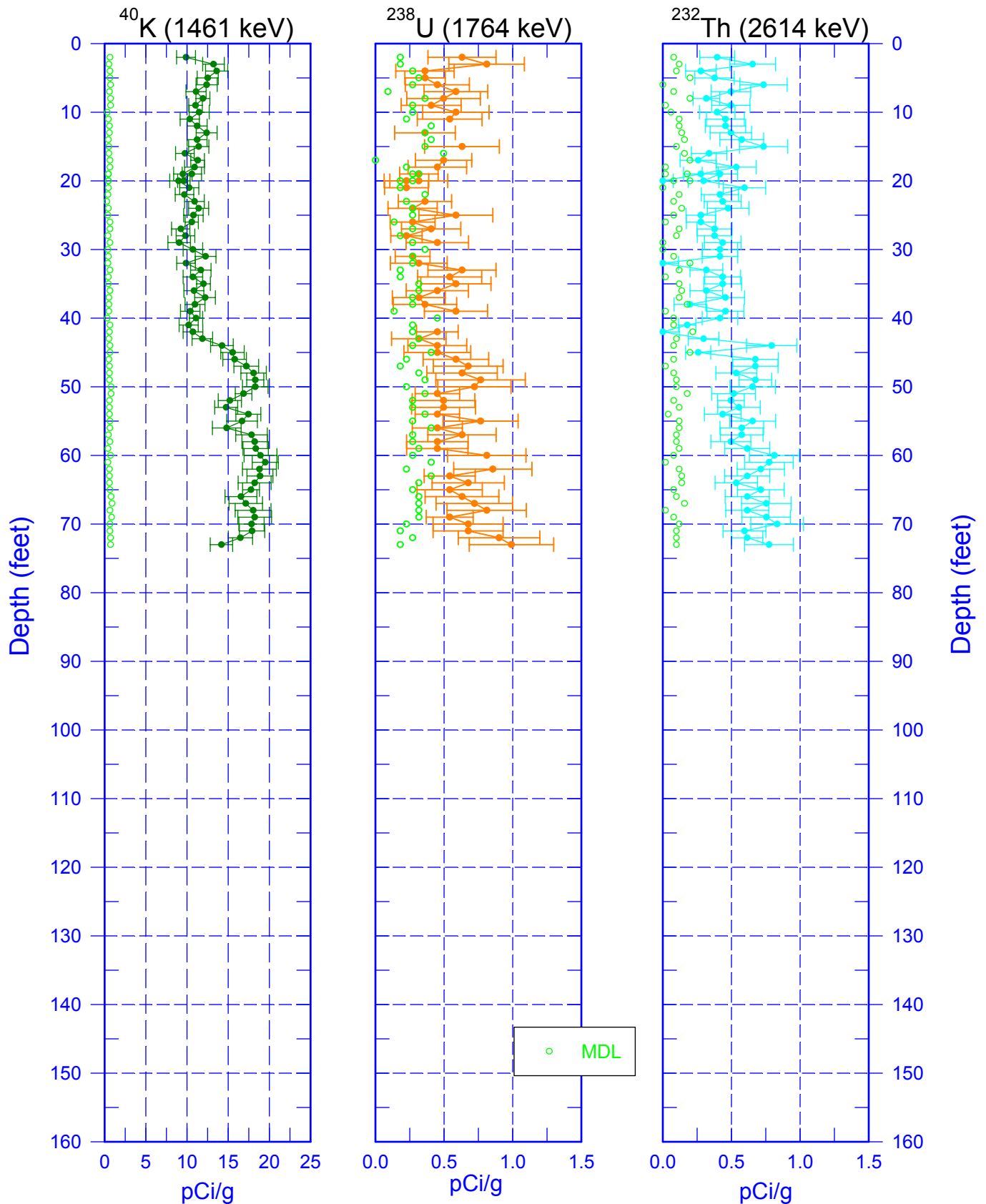
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## Man-Made Radionuclides



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## Natural Gamma Logs



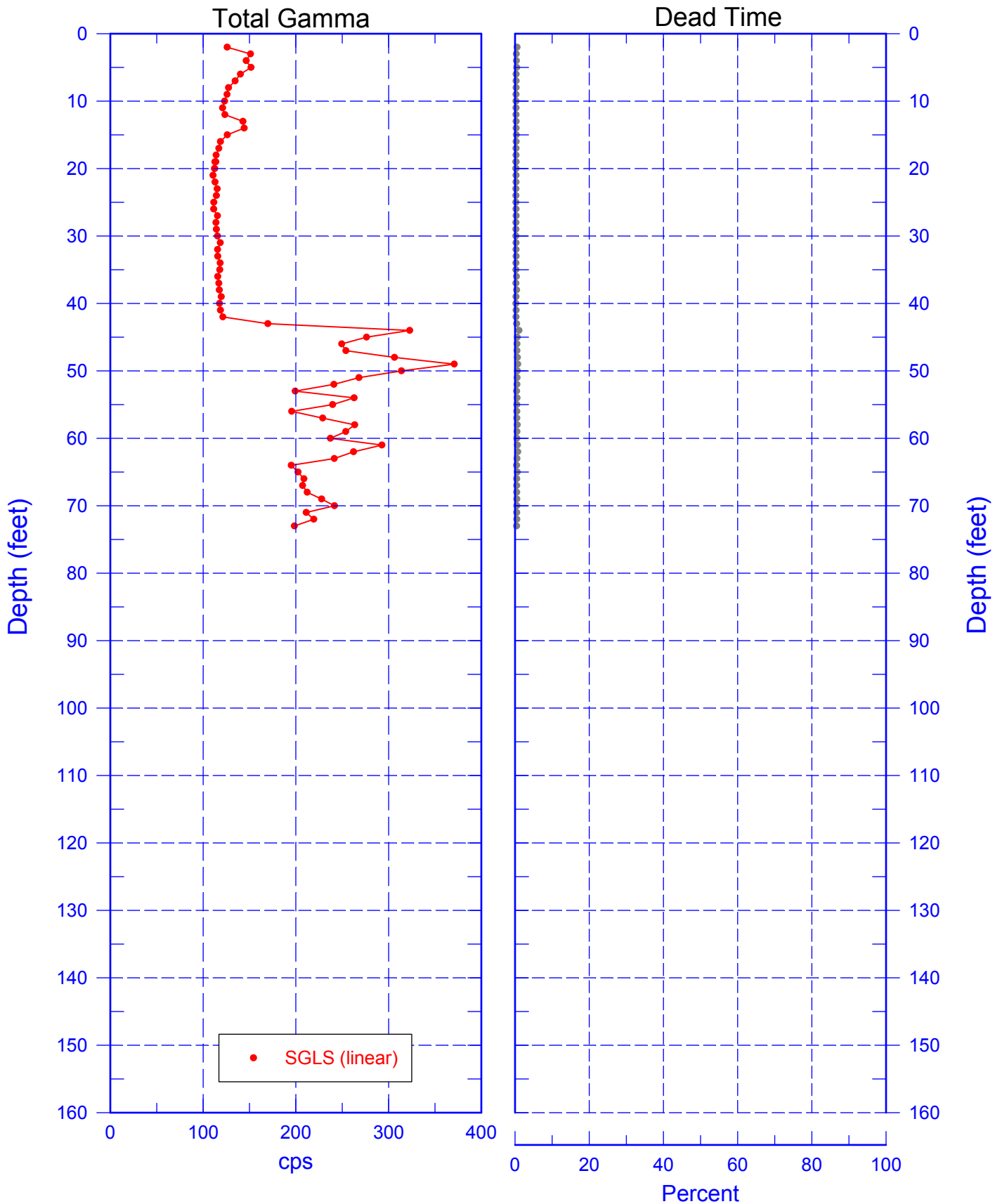
Zero Reference = Top of Casing

Last Log Date - 07/20/04

Last Logging Date - 07/20/04

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## Total Gamma & Dead Time

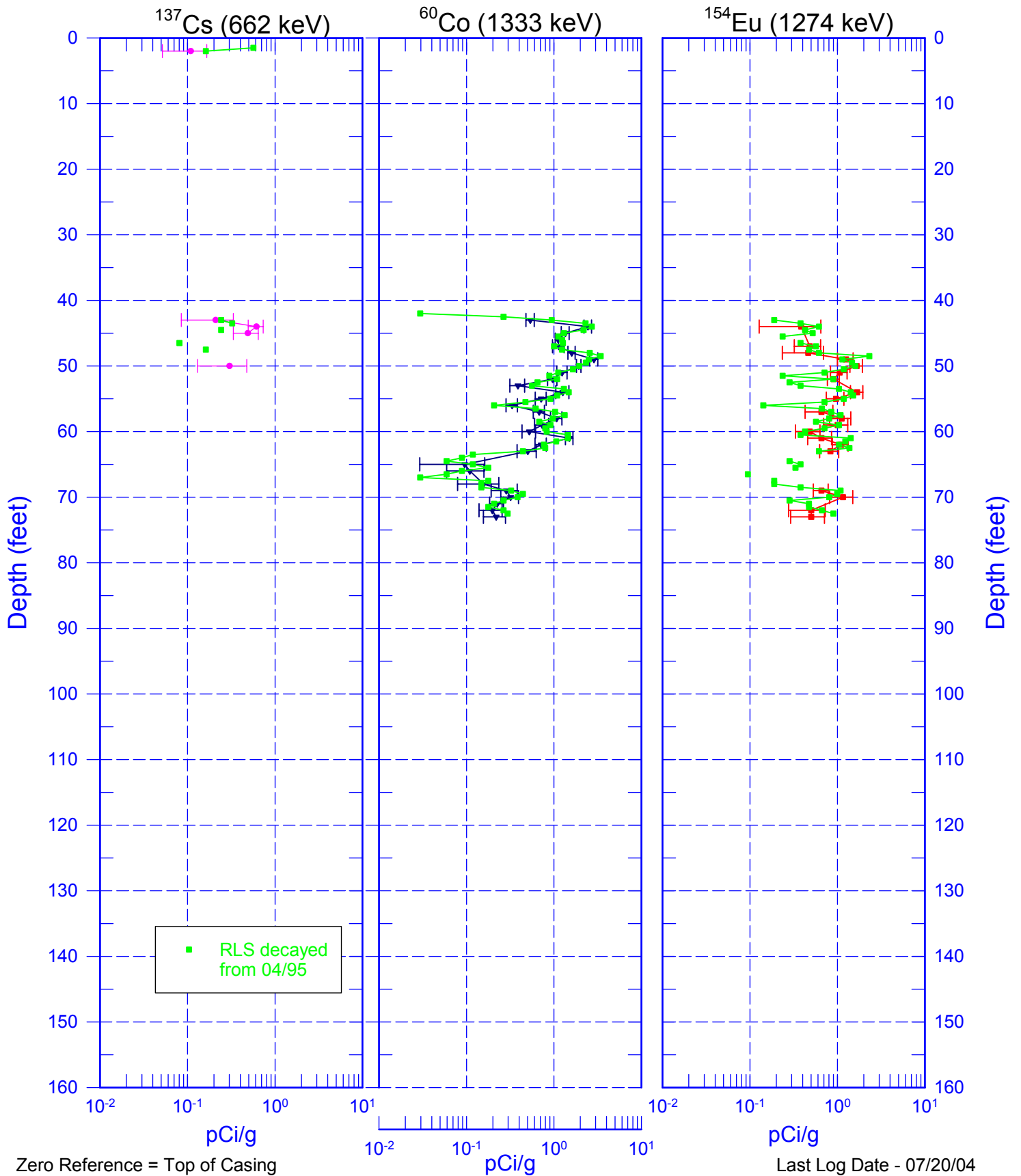


Zero Reference = Top of Casing

Last Logging Date - 07/20/04

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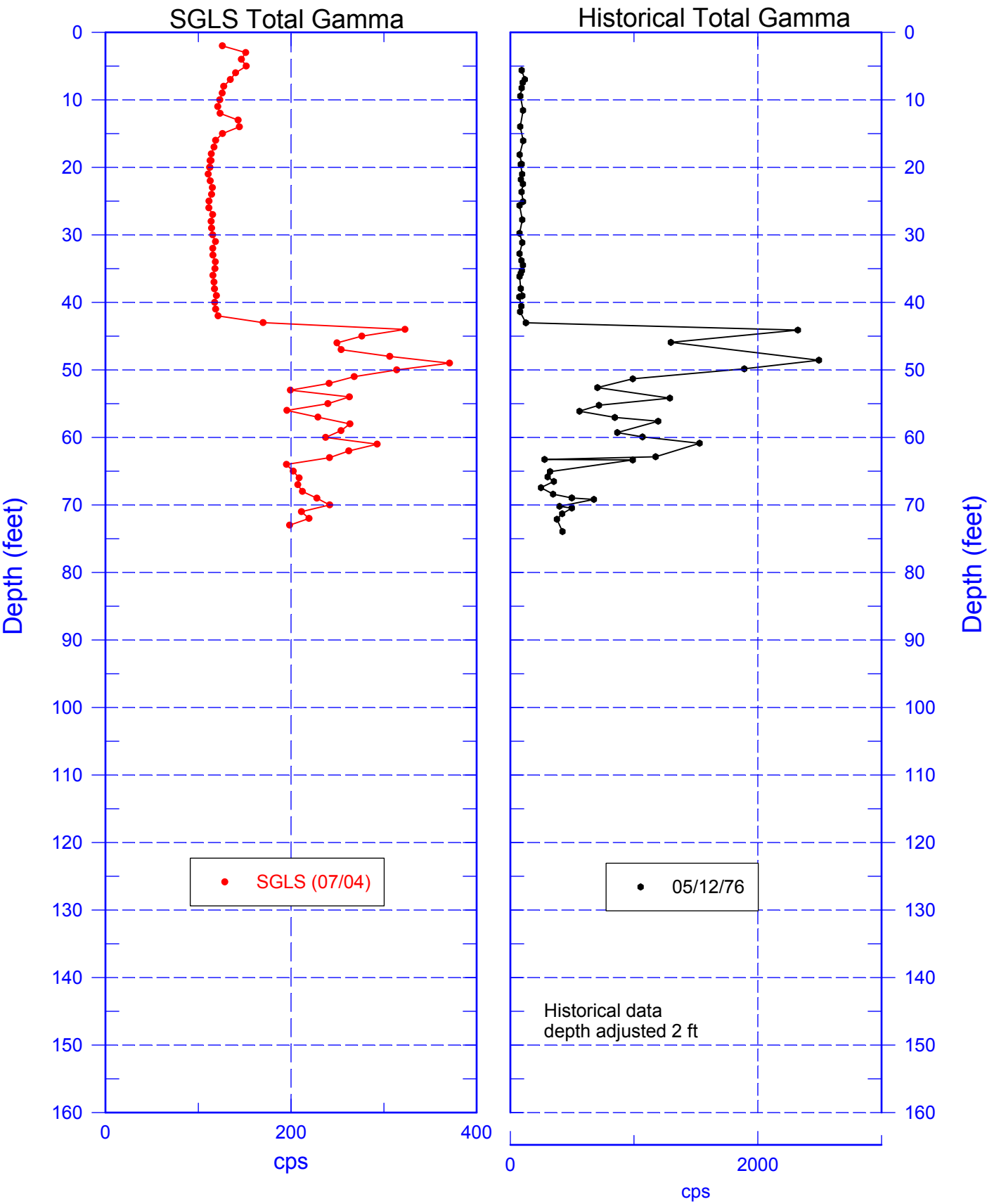
## Man-Made Radionuclide Comparison





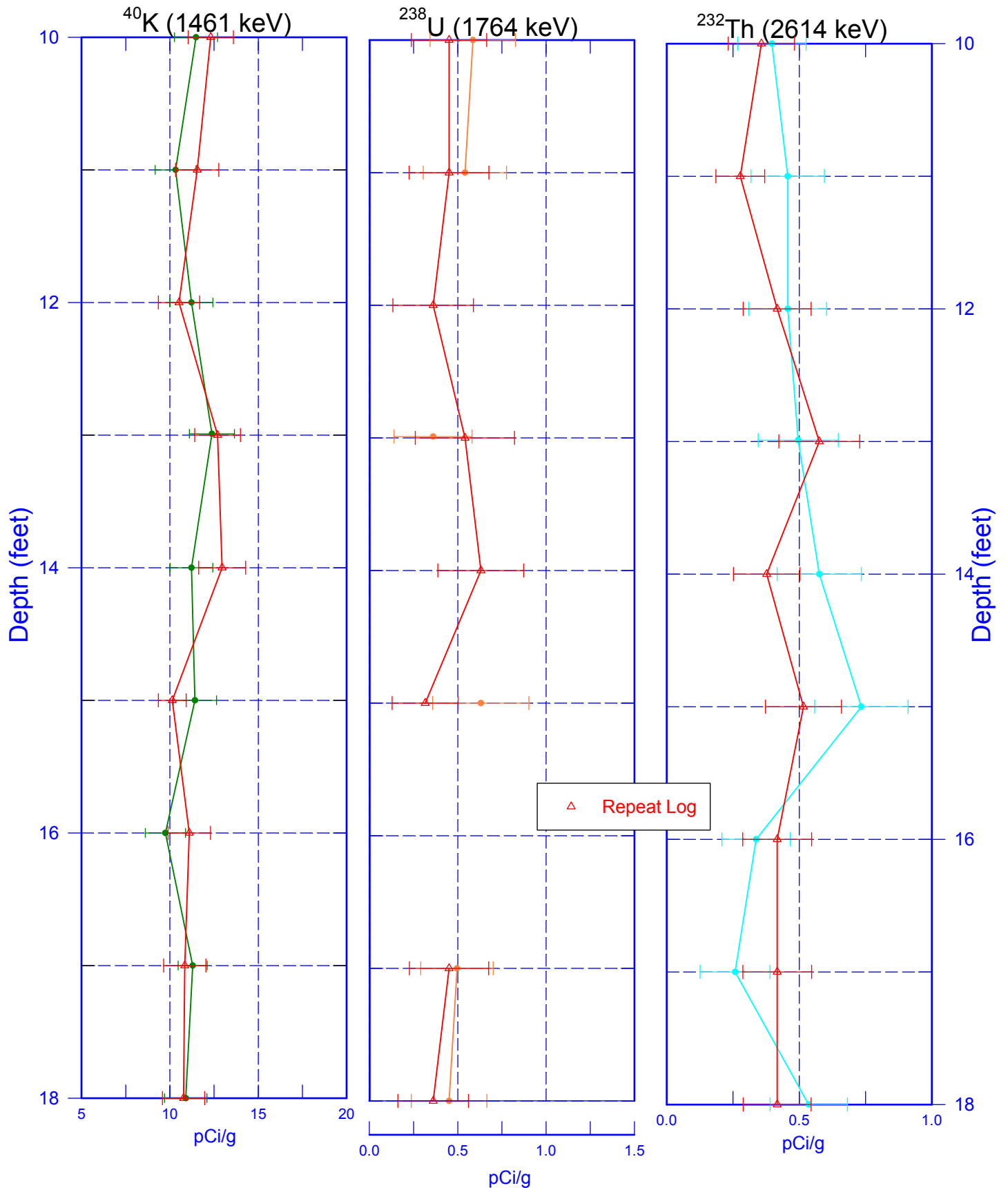
# 299-W15-78 (A7379)

## Total Gamma



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## Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing

Last Log Date - 07/20/04